

# TMDLs in the Shasta Valley

Presentation to the Shasta River CRMP

April 24, 2002

North Coast RWQCB

# Presentation Outline

- I. What is a Total Maximum Daily Load (TMDL)?
- II. Why are TMDLs developed?
- III. What TMDLs are being developed state-wide?
- IV. Why are TMDLs being developed for the Shasta River?
- V. How will the Shasta TMDLs be developed and what is the schedule?
- VI. What are examples of completed TMDLs?

# What is a TMDL?

- A Total Maximum Daily Load (TMDL) is a framework for assessing the condition of an entire watershed, evaluating the sources which have contributed to the water quality problems in the waterbody, and for developing a plan to restore water quality conditions.

# TMDL Objectives

1. To assess the health of a waterbody, and determine/confirm cause(s) / source(s) of stress.
2. To quantify the sources of the pollutant or stressor.
3. To determine how much of a particular pollutant or stressor a waterbody can handle and still be healthy.

## TMDL Objectives cont.

4. To identify whether and how much the different sources need to be reduced in order to support a healthy waterbody.
5. To develop a plan which, when implemented, will restore waterbody health.

# Why are TMDLs Developed?

- To address non-point source pollution that affects water quality.
- TMDLs are required under the federal Clean Water Act.
- Implementation of TMDLs protects all designated uses of a waterbody.
- Most people agree that waterbodies we can no longer fish from (or drink from) should be restored, to the extent possible.
- Helps establish priorities for allocation of available funding for restoration.

# Why are TMDLs developed?

- Section 303(d) of the federal Clean Water Act requires states to identify waterbodies that are **impaired**, and to develop a pollution control plan (TMDL) in order to attain and maintain water quality **standards**.
- “**Impaired**” means water quality standards are not being met.
- “**Standards**” refer to water quality objectives and beneficial uses.

# Beneficial Water Uses in the Klamath Basin

WATER BODY	MUN*	AGR*	IND*	PROC	GWR	FRSH	POW	REC1	REC2	COMM	WARM	COLD	WILD	RARE	MIGR	SPWN	AQUA
Lost River HA																	
Clear Lake Reservoir																	
& Upper Lost River	P	E	P	P	E	E	P	E	E	E	E	E	E	E		E	P
Lower Lost River		E	P	P	E	E		P	E	E	E		E	E			E
Tule Lake		E				E		P	E	E	E		E	E			E
Lower Klamath Lake		E						P	E	E	E		E	E			E
Butte Valley HA																	
Meiss Lake		E						P	E	E	E		E				E
Shasta Valley HA																	
Shasta River	P	E	P	P	E	E	P	E	E	E	E	E	E		E	E	P
Lake Shastina	P	E	P	P	E	E		E	E		E	E	E			E	P
Scott River HA																	
Scott River	P	E	P	P	E	E		E	E	E		E	E		E	E	P
Salmon River HA																	
Salmon River	P	P	P	P		E		E	E	E		E	E		E	E	P
Middle Klamath River HA																	
Iron Gate and																	
Copco Reservoir	P	P	P	P		E	E	E	E	E	E	E	E	E	E	E	E
Klamath River	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E

Source: Water Quality Control Plan, California Regional Water Quality Control Board, North Coast Region



DISSOLVED OXYGEN WATER QUALITY OBJECTIVES FOR THE KLAMATH BASIN		
WATER BODY	DISSOLVED OXYGEN (mg/l)	
	Minimum	50% Lower Limit
<u>Lost River HA</u>		
Clear Lake Reservoir & Upper Lost River	5.0	8.0
Lower Lost River	5.0	-
Other Streams	7.0	8.0
Tule Lake	5.0	-
Lower Klamath Lake	5.0	-
<u>Butte Valley HA</u>		
Streams	7.0	9.0
Meiss Lake	7.0	8.0
<u>Shasta Valley HA</u>		
Shasta River	7.0	9.0
Other Streams	7.0	9.0
Lake Shastina	6.0	9.0
<u>Scott River HA</u>		
Scott River	7.0	9.0
Other Streams	7.0	9.0
<u>Salmon River HA</u>		
All Streams	9.0	10.0
<u>Middle Klamath River HA</u>		
Klamath River above Iron Gate and Copco Reservoirs	7.0	10.0
Klamath River below Iron Gate	8.0	10.0
Other Streams	7.0	9.0
Note: 50% lower limit represents the 50 percentile value of the monthly means for a calendar year. 50% or more of the monthly means must be greater than or equal to the lower limit.		

# Temperature

- “The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses.”
- “At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature.”
- “At no time or place shall the temperature of WARM intrastate waters be increased more than 5°F above natural receiving water temperature.”

# Why are TMDLs developed?

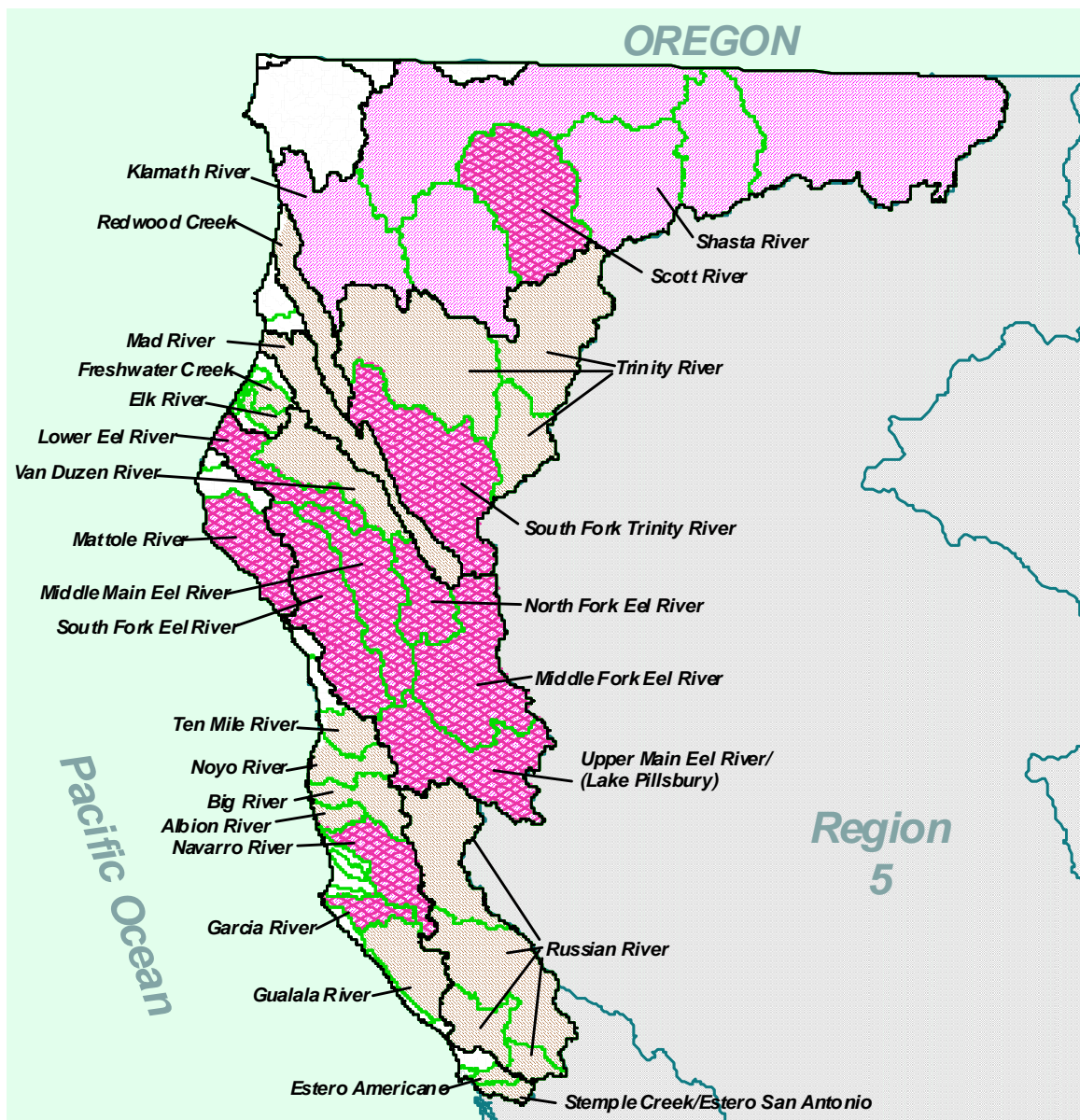
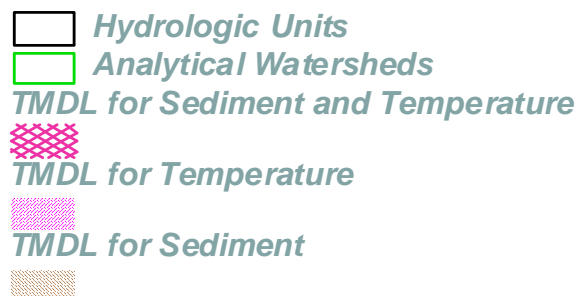
## **Porter-Cologne Water Quality Control Act**

- Authorizes implementation of CWA
- Designates TMDL development and implementation as an important factor in controlling non-point source pollution.

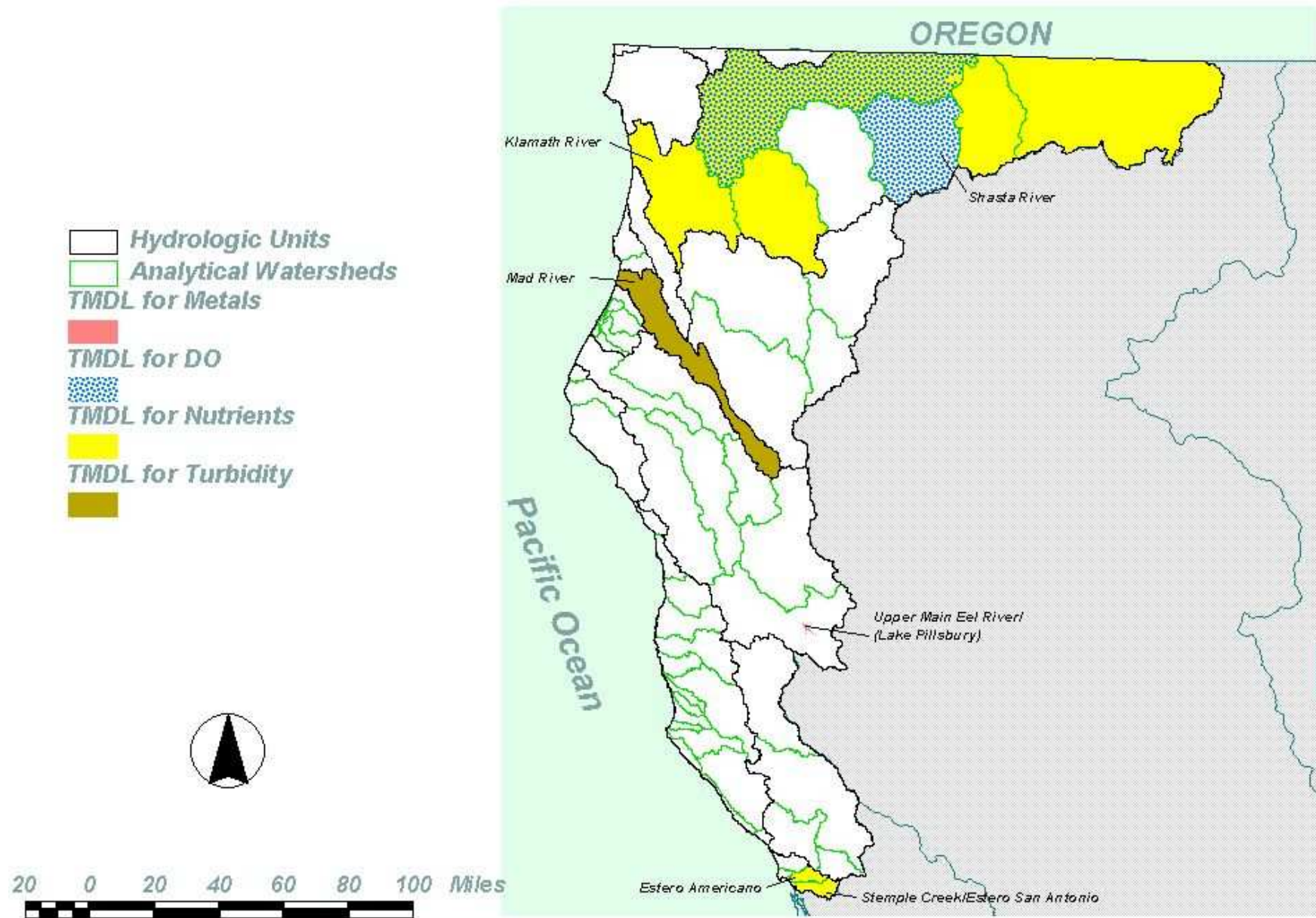
# TMDLs Nationwide and in CA

- 41,994 impairments nation-wide
- 1,400 impairments in CA
- 120 TMDLs currently being developed in CA
- Pollutants: metals, pesticides, pathogens, nutrients, sediment, temperature, trash, salts
- Pollutant categories are generally attributable to specific land uses.

# 1998 - 303(d) Temperature and/or Sediment Impaired Waterbodies



# 1998 - 303(d) Waterbodies Impaired by “Other” Pollutants



# Why are TMDLs being developed for the Shasta River?

- Shasta River watershed listed for DO and temperature in 1992
- Water quality data from late 1980s and early 1990s documented low DO and warm temperatures -- threat to salmonids
- Important progress has been achieved in the past 10 years to improve water quality in the basin



# Why are TMDLs being developed for the Shasta River?

- Recent monitoring and assessment shows that water quality objectives and criteria are not being met at various locations throughout the watershed.
- Effort to protect all designated beneficial uses of the Shasta River, including agricultural supply, cold freshwater habitat, and recreation.
- Shasta River is tributary to Klamath River, which is impaired for DO, nutrients, and temperature.



# Why are TMDLs being developed for the Shasta River?

- Law suit against US EPA requires development of Shasta River TMDLs by 2005.
- SWRCB's "Nonpoint Source Program Strategy and Implementation Plan" identifies the development of Shasta River TMDLs in 15-year strategy for addressing nutrient management in control of agricultural-related nonpoint source pollution.

# What are the components of a TMDL?

- Problem Statement
  - Define conditions in watershed
  - Characterize impairment
- Numeric Targets
  - Quantitative or narrative measure of desired conditions
  - Can vary from place-to-place and from season-to-season.
- Source Analysis
  - Determine natural and human sources of pollutants

# What are the components of a TMDL?

- Linkage Analysis
  - Make connections between land use conditions and water quality conditions
- Loading Capacity
  - Determine how much of a pollutant a waterbody can handle and still support beneficial uses
- Allocations
  - Determine how much different sources need to be reduced to achieve desired water quality conditions

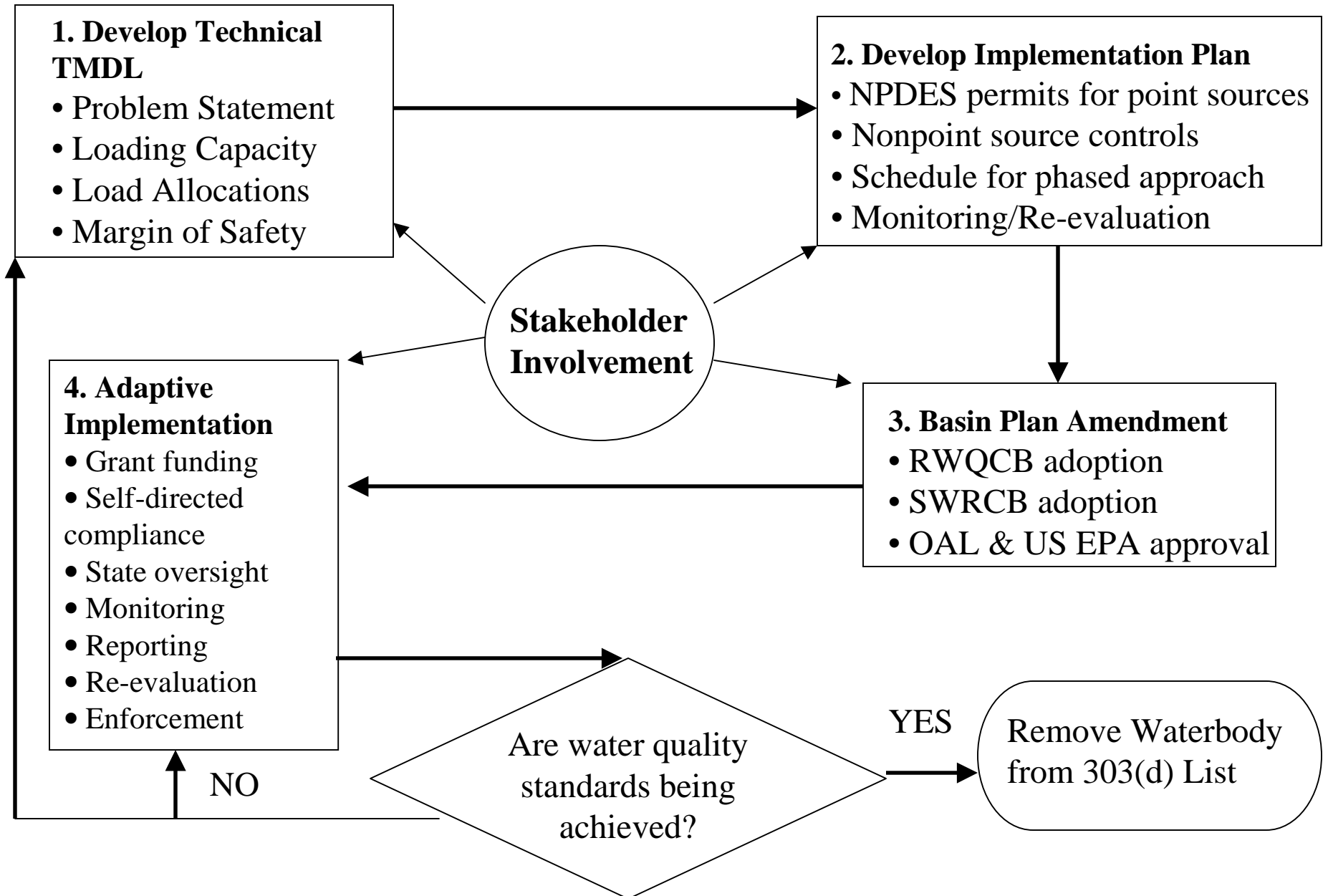
# What are the components of a TMDL?

- Margin of Safety and Seasonal Variation
  - Account for uncertainty and seasonal differences
  - In absence of sufficient data, must make conservative assumptions
  - Conservative approach reduces flexibility
- Implementation Plan
  - Site-specific approach and schedule to restore waterbody
- Monitoring and Re-evaluation
  - Plan for assessing progress

# There are four steps to a TMDL:

1. Develop Technical TMDL (also called Technical Support Document)
2. Develop Implementation Plan
3. Basin Plan Amendment
4. Implement TMDL

# Steps in Developing and Implementing TMDLs



# Grant Funding Sources

## Water Quality Grants

- 205 (j): Watershed planning
- 319 (h): On-the-ground implementation

Contact: Michele Fortner (707) 575-6706

- Prop 13: On-the-ground implementation

Contact: Bernadette Reed (707) 576-2678

- Watershed Coordinator: Janet Blake  
(707) 576-2805

# Phases & Schedule for Shasta River TMDLs

RWQCB staff develop Technical TMDL 12/04

RWQCB adopt TMDL with Implementation Plan  
12/05

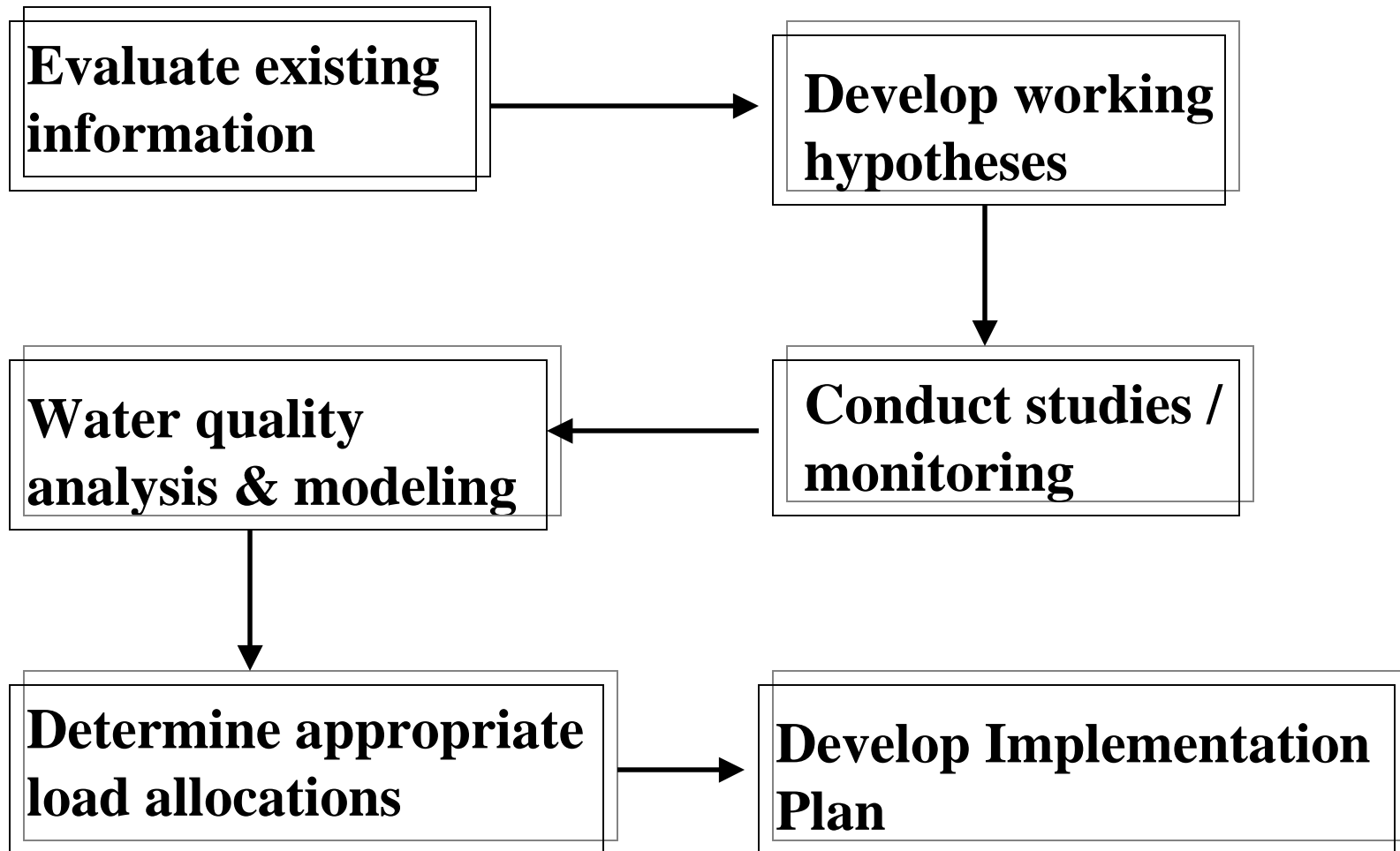
SWRCB adopt TMDL 12/06

US EPA approve TMDL 12/06

RWQCB staff work with landowners to implement  
TMDL 1/07



# Approach to developing Shasta River TMDLs



# Existing Information Review

- RWQCB:

Waste Discharge Requirements for wastewater treatment facilities

Water quality monitoring data from 1986-1996  
SWAMP data 2001-2002

- DFG:

Fisheries surveys

Temperature and flow monitoring and modeling  
(Watercourse Engineering)

- USFWS:

Aerial photography

2001 water quality monitoring data

# Existing Information Review cont.

- DWR:
  - Water resources reports (1950s thru 1990s)
  - 2001-2002 water quality monitoring data
  - Water Master flow records
- USGS:
  - Gaged flow records
  - Geology/soils and water resource studies (1960s thru 1980s)
- Siskiyou County:
  - Land use records
  - Stormwater management activities
- Shasta River CRMP
  - 319(h) Project reports

# Questions Related to DO

- What is causing low DO in parts of the Shasta River?
- What role do natural sources of nutrients play in changes in DO levels in the Shasta River?
- What role do human-related sources, such as wastewater treatment facilities and irrigation return flows, play in changes in DO levels in the Shasta River?
- How do nutrients and organic material move through the Shasta River?

# Questions Related to Temperature

- How does groundwater affect water temperature in the Shasta River?
- How does irrigation return flows affect water temperature in the Shasta River?
- How do characteristics of the Shasta Valley affect heat gain/loss in the Shasta River?
- How does Lake Shastina affect water temperatures in the Shasta River?

# Next Steps

- Meet with stakeholders
  - Get feedback
  - Answer questions
  - Discuss access
- Evaluate existing information
  - Refine working hypotheses
  - Refine monitoring plans
- Coordinate with other agencies
  - Streamline monitoring efforts

# Next Steps

- Conduct monitoring / assessment
  - Characterize DO conditions
  - Assess potential influence of upper basin and Lake Shastina on conditions in lower Shasta River
  - Quantify natural sources of nutrients
  - Assess influence of human-caused sources on conditions in Shasta River

# Examples of TMDLs

Stemple Creek - Nutrients, DO, and Sediment

Laguna de Santa Rosa - Ammonia and DO

Garcia River - Sediment

Newport Bay/San Diego Creek - Nutrients



# Stemple Creek Nutrient & Sediment TMDL

32,000 acre watershed in Sonoma County - agriculture (dairies) and rural residential

TMDL Implementation Plan *encouraged* landowners to develop and implement Ranch Plans to address range management, animal waste management, and erosion control.

Landowners initiated development of Animal Resource Management Committee, which developed waste management guidelines and implemented a landowner monitoring program.

# Stemple Creek Nutrient & Sediment TMDL cont.

Educational materials and technical support provided by RCDs, NRCS, UC Extension, and RWQCB.

Stated goal of TMDL to support agriculture as the major land use in the watershed - zoning, open space districts and land trusts.

Many restoration projects funded through CWA Section 319(h) grant funds.

To date, implementation has been completely voluntary, and significant water quality improvements have been documented.

# Laguna de Santa Rosa

## Ammonia & DO TMDL

160,000 acre watershed in Sonoma County - urban, agriculture (dairy, orchards)

TMDL Implementation Plan incorporates the following programs to reduce nutrient loads:

- City of Santa Rosa wastewater treatment
  - Upgrade of system to achieve nitrogen removal targets
- City of Santa Rosa Stormwater Runoff Program
  - Education and outreach on control of urban pollutants, including landscape fertilization
  - Street sweeping
  - Wetland restoration

# Laguna de Santa Rosa

## Ammonia & DO TMDL

- 319(h) grant program

### Manure management

- Improvements to manure application practices
- Construction/upgrade of manure ponds
- Wetlands treatment

### Animal Waste Subcommittee

- Developed guidelines for animal waste management
- Develop assessment forms for ranchers to assess and improve practices

Self monitoring test kits provided by NRCS

# Garcia River Sediment TMDL

23,000 acre watershed in Mendocino County -  
ag (row crops, dairy, grazing) and rural residential  
TMDL Implementation Plan requires landowners to  
comply with TMDL through one of three options:

Option 1: Comply with the waste discharge  
prohibitions that apply to the watershed.

Option 2: Comply with an approved Erosion Control  
Plan and a Site-Specific Management Plan.

Option 3: Comply with an approved Erosion Control  
Plan and the Garcia River Management Plan.

# Garcia River Sediment TMDL cont.

All landowners given 3 years to conduct inventory of controllable sediment on property and develop plans and a schedule to control the sediment.

Forest land owners given 10 years to implement plan and conduct monitoring.

Agricultural land owners given 20 years to implement plan and conduct monitoring.

# Newport Bay/San Diego Creek Nutrient TMDL

TMDL Implementation Plan included following components:

- Waste Discharge Requirements for nurseries of  $\geq 5$  acres - installation of drip irrigation
- Orange County Farm Bureau, UC Extension, and affected growers developed watershed-wide nutrient management program for agricultural activities
- Review of Orange County's Areawide Urban Stormwater Program best management practices
- Self monitoring with oversight by RWQCB

# Summary

- I. What is a Total Maximum Daily Load (TMDL)?
- II. Why are TMDLs developed?
- III. What TMDLs are being developed state-wide?
- IV. Why are TMDLs being developed for the Shasta River?
- V. How will the Shasta TMDLs be developed and what is the schedule?
- VI. What are examples of completed TMDLs?



# Contacts

Matt St. John: (707) 570-3762  
stjom@rb1.swrcb.ca.gov

David Leland: (707) 576-2069  
lelad@rb1.swrcb.ca.gov

North Coast RWQCB  
5550 Skylane Blvd.  
Suite A  
Santa Rosa, CA 95403

# Nonpoint Source Program

## Three-Tiered Approach

- **Tier one: Self-determined implementation** of management practices where landowners develop and implement workable solutions to NPS pollution. This affords them the opportunity to solve their own problems before more stringent regulatory actions are taken.
- **Tier Two: Regulatory-based encouragement** of management practices where the Regional Board does not impose effluent requirements on dischargers who are implementing management practices in accordance with a waiver of waste discharge requirements, an approved Management Agency Agreement, or other formal Regional or State Water Board action.
- **Tier Three: Effluent limitations and enforcement** where the Regional Board can enforce requirements on any proposed or existing waste discharge, including NPS discharges.